

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 Claim 1 (original): A position information
2 transmission method for transmitting and receiving road
3 shape information and event information, the method
4 comprising the steps of:
5 intermittently selecting nodes in a target road
6 section on a digital map;
7 transmitting road shape information, wherein the road
8 shape information includes coordinate data of a selected
9 nodes and designates a target road section;
10 executing a map matching based on the road shape
11 information including coordinate information of the
12 selected nodes;
13 obtaining a road between the selected nodes by using
14 a route search; and
15 identifying the target road section on the digital
16 map;
17 wherein said steps of selecting nodes and transmitting
18 road shape information are executed at a transmitting side,
19 and
20 wherein said steps of executing a map matching,
21 obtaining a road, and identifying the target road section

22 are executed at a receiving side.

1 Claim 2 (original): The method according to claim 1,
2 wherein the road shape information transmitted from
3 the transmitting side includes supplementary information
4 indicating attributes of the selected nodes, and
5 wherein the receiving side references the
6 supplementary information in the step of executing a map
7 matching in order to determine the positions of the nodes.

1 Claim 3 (original): The method according to claim 2,
2 wherein the supplementary information indicating the
3 attributes of the nodes includes at least one of a node
4 type, a node name, a number of connecting links, angles
5 between connecting links, and an intercept azimuth at the
6 selected node.

1 Claim 4 (original): The method according to claim 2,
2 wherein the supplementary information indicating the
3 attributes of the nodes includes an intercept azimuth at
4 the selected node and at least one of a node type, a node
5 name, a number of connecting links, and angles between
6 connecting links.

1 Claim 5 (original): The method according to claim 1,
2 wherein the road shape information transmitted from

3 the transmitting side includes supplementary information
4 indicating attributes of links included between the
5 selected nodes, and

6 wherein the receiving device references the
7 supplementary information during using the route search in
8 the step of obtaining the road between the nodes.

1 Claim 6 (original): The method according to claim 5,
2 wherein the supplementary information indicating the
3 attributes of the links includes at least one of a road
4 type, a road number, and a link type.

1 Claim 7 (original): The method according to claim 1,
2 wherein the transmitting side selects a plurality of
3 nodes arranged around the selected node in the step of
4 intermittently selecting nodes in the target road section
5 and transmits the road shape information including the
6 coordinate data of each selected node.

1 Claim 8 (original): The method according to claim 1,
2 further comprising the steps of:

3 evaluating an accuracy of the matching at the
4 receiving side based on a distance from the node to a
5 closest point on an adjacent road and a difference between
6 the intercept azimuths at the node and at the closest point
7 on the adjacent road;

8 selecting a plurality of nodes arranged around the
9 selected node in the step of the intermittently selecting
10 nodes in the target road section; and
11 transmitting the road shape information including the
12 coordinate data of each selected node,
13 wherein the steps of evaluating an accuracy of the
14 matching, selecting a plurality of nodes, and transmitting
15 the road shape information are executed at the transmitting
16 side.

1 Claim 9 (original): The method according to claim 1,
2 further comprising the steps of:

3 comparing a setting date of the digital map data of
4 the road in the target road section with a regulated date;
5 and

6 transmitting the road shape information including data
7 representing the road shape in the target road section, in
8 case of that the setting date is later than the regulated
9 date;

10 wherein the steps of the comparing a setting date with
11 a regulated date and transmitting the road shape
12 information are executed at the transmitting side.

1 Claim 10 (original): The method according to claim 1,
2 wherein the road shape information transmitted from
3 the transmitting side includes a setting date that the

4 digital map data of the road in the target road section was
5 set, and

6 wherein the step of identifying the target road
7 section is skipped in case of that the setting date is
8 latter than a creation date of a digital map data which the
9 receiving side owns.

1 Claim 11 (original): The method according to claim 1,
2 wherein the road shape information transmitted from
3 the transmitting side includes distance data between the
4 intermittently selected nodes, and

5 the method further comprising the step of:

6 comparing the distance of the road connecting the
7 nodes obtained by way of the route search and the distance
8 between the nodes in the road shape information; and

9 discriminating propriety of the route search;

10 wherein the steps of the comparing the distances and
11 discriminating the propriety are executed at the receiving
12 side.

1 Claim 12 (original): The method according to claim 1,
2 further comprising the steps of:

3 evaluating an accuracy of the matching of nodes in the
4 target road section; and

5 determining a length of the target road section or
6 number of the nodes in the road shape information based on

7 the result of the step of evaluating;

8 wherein the steps of the evaluating the accuracy and
9 determining the length are executed at the transmitting
10 side.

1 Claim 13 (original): The method according to claim
2 12,

3 wherein, in the step of evaluating the accuracy, the
4 accuracy of the matching is evaluated based on a distance
5 from a node to a closest point on an adjacent road and the
6 difference between the intercept azimuths at the node and
7 at the closest point.

1 Claim 14 (original): A position information
2 transmission apparatus for transmitting road shape
3 information to specify the target road section on a digital
4 map, the apparatus comprising:

5 position information converting means for selecting
6 the target road section;

7 transmit node extracting means for intermittently
8 selecting nodes in the road shape information out of the
9 nodes arranged on the target road section; and

10 transmitting means for transmitting the selected nodes
11 of the target road section.

1 Claim 15 (original): A position information receiving

2 apparatus for receiving road shape information designating
3 a target road section on a digital map and for specifying
4 the target road section based on the road shape
5 information, the apparatus comprising:

6 map matching means for performing map matching to
7 determine positions of selected nodes included in the road
8 shape information; and

9 route search means for obtaining the road connecting
10 the nodes determined to reproduce the target road section.

1 Claim 16 (original): The position information
2 receiving apparatus according to claim 15,

3 wherein the map matching means executes a map matching
4 based on node information of some of the nodes included in
5 the road shape information to determine the positions of
6 the nodes on a digital map.

1 Claim 17 (original): The position information
2 receiving apparatus according to claim 15,

3 wherein the map matching means executes a map matching
4 based on node information at least two nodes in the road
5 shape information to determine the positions of the nodes
6 on a digital map.

1 Claim 18 (new): A method for identifying position of
2 a target road section on a digital map, said method

3 comprising the steps of:

4 at a transmitting side having a first digital map,
5 creating position information of the target road
6 section on a first digital map, wherein said position
7 information includes coordinate information of nodes
8 selected from the target road section;

9 sending said position information of the target road
10 section;

11 at a receiving side having a second digital map,
12 receiving said position information of the target road
13 section;

14 calculating a path connecting said selected nodes on
15 the second digital map based on said coordinate
16 information; and

17 identifying position of said target road section on
18 the second digital map based on the calculated path.

1 Claim 19 (new): The method according to Claim 18,
2 wherein, in the step of calculating the path between
3 the selected nodes, said receiving side calculates the
4 shortest path between said selected nodes.

1 Claim 20 (new): The method according to Claim 18,
2 wherein said nodes are intermittently selected from
3 the target road.

1 Claim 21 (new): A method for identifying position of
2 a target road section on a digital map, said method
3 comprising the steps of:

4 at a transmitting side having a first digital map,
5 creating position information of the target road
6 section on the first digital map, wherein said position
7 information includes nodes intermittently selected from
8 said target road section and representing said target road
9 section, coordinate information of the selected nodes, and
10 supplementary information;

11 sending said position information of said target road
12 section;

13 at a receiving side having a second digital map,
14 receiving said position information of said target
15 road section;

16 calculating a path connecting the selected nodes on a
17 second digital map with referring to at least the
18 supplementary information; and

19 identifying position of said target road section on
20 the second digital map based on said calculated path.

1 Claim 22 (new): The method according to any one of
2 claims 18 to 21,

3 wherein said position information includes a node on
4 a intersection.

1 Claim 23 (new): The method according to any one of
2 the claims 18 to 21,
3 wherein said position information includes a node on
4 any points between intersections.

1 Claim 24 (new): The method according to any one of
2 claims 18 to 20,
3 wherein said position information includes a node in
4 the middle of distance between intersections or in the
5 vicinity of the middle of distance between intersections.

1 Claim 25 (new): The method according to Claim 21,
2 wherein said supplementary information indicates
3 attribute of the selected nodes.

1 Claim 26 (new): The method according to Claim 21,
2 wherein said supplementary information indicates
3 attribute of a path between said selected nodes.

1 Claim 27 (new): The method according to Claim 25,
2 wherein said attribute of nodes indicates any one of
3 a road type, an intercept azimuth, a crossing link angle,
4 and a road name, at each nodes.

1 Claim 28 (new): The method according to Claim 26,
2 wherein said attribute of path indicates any one of a

3 length and a road type, of the path.

1 Claim 29 (new): A method for identifying position of
2 a target road section on a digital map, said method
3 comprising the steps of:

4 at a transmitting side having a first digital map,
5 creating position information of the target road
6 section, wherein said position information includes
7 coordinate information of nodes selected from the target
8 road section and at least a part of said nodes represent a
9 shape of a predetermined section of the target road
10 section;

11 sending said position information of the target road
12 section;

13 at a receiving side having a second digital map,
14 identifying position of said predetermined section on
15 the second digital map by using said shape;

16 calculating a path of the other section on the second
17 digital map; and

18 identifying position of the target road section on the
19 second digital map based on the identified position of said
20 predetermined section and the calculated path.

1 Claim 30 (new): The method according to claim 29,
2 wherein said nodes representing said predetermined
3 section are selected more thickly than the other section.

1 Claim 31 (new): The method according to claim 29,
2 wherein said predetermined section is a section which
3 is estimated to cause an error matching at the sending
4 side, or a section which is estimated to cause a
5 miscalculation of a path thereof at the sending side.

1 Claim 32 (new): The method according to claim 29,
2 wherein said predetermined section falls into one of
3 a section to which plural roads run parallel and a section
4 having a possibility that plural paths are calculated.

1 Claim 33 (new): An apparatus for providing position
2 information indicating a target road section on a digital
3 map, said apparatus comprising:
4 means for identifying a target road section on a
5 digital map;
6 means for intermittently selecting nodes from points
7 arranged on the target road section;
8 means for obtaining coordinate information of the
9 selected nodes;
10 means for creating position information from the
11 obtained coordinate information; and
12 means for transmitting the position information.

1 Claim 34 (new): An apparatus for providing position

2 information indicating a target road section on a digital
3 map, said apparatus comprising:

4 means for identifying a target road section on a
5 digital map;

6 means for selecting a predetermined section from the
7 target road section;

8 means for intermittently selecting nodes from points
9 arranged on the target road section in such manner that
10 nodes are selected more thickly in the predetermined
11 section than the other section of the target road section;

12 means for obtaining coordinate information of the
13 selected nodes;

14 means for creating position information from the
15 obtained coordinate information; and

16 means for transmitting the position information.

1 Claim 35 (new): An apparatus for identifying position
2 of a road section represented by position information, said
3 apparatus comprising:

4 means for determining position of nodes representing
5 the target road section based on the position information;

6 means for calculating a path connecting the nodes;

7 means for identifying position of the road section;

8 and

9 means for reproducing the road section.

1 Claim 36 (new): The apparatus according to claim 35,
2 wherein said position identification means identifies
3 the position of the target road section based on the
4 coordinate information of at least one of the nodes
5 included in the position information.

1 Claim 37 (new): The apparatus according to claim 35,
2 wherein said position identification means identifies
3 the position of the target road section based on the
4 coordinate information of at least two of the nodes
5 included in the position information.

1 Claim 38 (new): A program product for creating and
2 transmitting position information, said program product
3 comprising a computer usable medium including therein a
4 computer readable program code, said computer readable
5 program code comprising:

6 program code means for creating position information
7 of a target road section on a first digital map, wherein
8 said position information includes nodes intermittently
9 selected from points of the target road section and
10 representing the target road section; and

11 program code means for transmitting said position
12 information to a receiving side having a second digital
13 map.

1 Claim 39 (new): A program product for receiving
2 position information and identifying a position of a target
3 road section represented by the position information, said
4 program product comprising a computer usable medium
5 including therein a computer readable program code, said
6 computer readable program code comprising:

7 program code means for receiving the position
8 information including coordinate information of nodes
9 selected from points arranged on the object on a first
10 digital map;

11 program code means for calculating a path connecting
12 the nodes;

13 program code means for identifying position of the
14 object on a second digital map based on the coordinate
15 information and the calculated path.

1 Claim 40 (new): A method for identifying a first road
2 section on a first digital map, and identifying a second
3 road section, corresponding to the first road section, on
4 a second digital map, the method comprising the steps of:

5 selecting the first road section on the first digital
6 map;

7 selecting first plural points located on the first
8 road section, on the first digital map;

9 creating location information indicative of
10 coordinates of the first plural points on the first digital

11 map;
12 identifying plural second points, corresponding to the
13 first plural points, on the second map with reference to
14 the location information;
15 calculating a path connecting the second plural points
16 on the second map; and
17 identifying the second road section on the second map
18 based on the path.

1 Claim 41 (new): A method for identifying a first road
2 section on a first digital map, and identifying a second
3 road section, corresponding to the first road section, on
4 a second map, the method comprising the steps of:
5 selecting the first road section on the first digital
6 map;
7 extracting a part of the first road section as a
8 predetermined section on the first digital map;
9 selecting first plural points located on the first
10 predetermined section on the first digital map;
11 creating location information indicative of
12 coordinates of the first plural points on the first digital
13 map;
14 creating positional information indicative of a
15 relative positional relationship between the first road
16 section and the first predetermined section on the first
17 digital map;

18 identifying plural second points, corresponding to the
19 first plural points, on the second map with reference to
20 the location information;
21 identifying a second predetermined section,
22 corresponding to the first predetermined section, on the
23 second digital map based on the plural second points; and
24 identifying the second road section on the second map
25 based on the second predetermined section and the
26 positional information.

1 Claim 42 (new): The method according to claim 40 or
2 41,
3 wherein the coordinate information indicates an
4 absolute coordinate of one of the first plural points as
5 the coordinate of the one of the first plural points, and
6 a relative positional relationship between the one of the
7 first plural points and another one of the first plural
8 points as the coordinate of the other one of the first
9 plural points.

1 Claim 43 (new): The method according to claim 40 or
2 42,
3 wherein the first plural points include a start node
4 and an end node of the first road section on the first
5 digital map.

1 Claim 44 (new): A method for identifying a road
2 section on a digital map with reference to location
3 information, the method comprising the steps of:
4 identifying plural points on the digital map with
5 reference to the location information;
6 calculating a path connecting the plural points on the
7 digital map; and
8 identifying the road section on the digital map based
9 on the path.